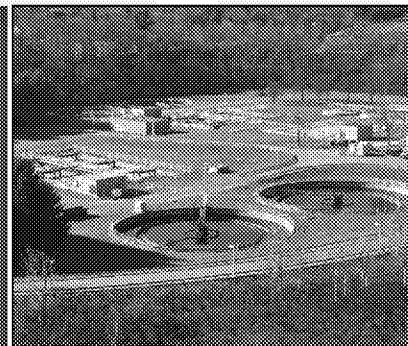


Wastewater Treatment Recommendations for PENNSYLVANIA

Pennsylvania is continuing work with neighboring states to clean up shared waters that run to the Chesapeake Bay. This effort is part of the Phase 3 Watershed Implementation Plan (Phase 3 WIP). The state believes that the path to success starts at the local level, and wastewater management is an important part of the solution. By building on the past success in the wastewater sector, wastewater managers can continue to improve local water quality.



Wastewater Workgroup Findings & Recommendations

Over \$1.4 billion has been invested in the wastewater sector. These investments were necessary due to federal cleanup obligations. The largest municipal sewage treatment plants in the basin have made nutrient reductions. This sector has met federal obligations for reductions ahead of schedule. Given this sector continues to meet federal obligations, major additional nutrient reduction opportunities are limited. The Phase 3 WIP Wastewater Workgroup developed several reduction scenarios which are identified below.

Enhanced Nutrient Removal (ENR) at Significant Wastewater Plants

Action: Reviewed feasibility of ENR for additional nitrogen and phosphorus reduction.

Findings: This scenario is not recommended. This is a low reduction, high cost approach. The costs do not justify the expensive treatment plant upgrades by a sector already meeting their federal goals. ENR upgrade cost estimates were developed for thirteen (13) facilities. Average annual cost per pound of total nitrogen reduction is estimated to vary between \$2/ lb TN per year and \$400/ lb TN per year, with the average cost being around \$30 lb TN per year. The large variation in \$/lb of TN removed indicates that using the average value for TN removal to estimate cost for other facilities may not be appropriate.

Estimated annual cost: Cost to upgrade to ENR is facility specific and should be evaluated case by case.

Wastewater Plant Optimization

Action: Reviewed feasibility of plant optimization for nitrogen and phosphorus reduction at largest wastewater plants.

Findings: Not all treatment facilities are suitable for optimization. Significant technical and financial support would be needed to implement this alternative. Reductions gained by this alternative may be moderate.

Estimated annual cost:

- Existing Optimization Program approximate cost: \$250,000/yr (1.5 FTEs + equipment operation and maintenance + lab fees + analytical equipment)
- Proposed DEP led Optimization Program: DEP to Deploy analytical equipment and provide facility with real time data to help optimize plants for nutrient removal. Approximate cost: \$1.26M/yr, does not include upfront equipment cost.
 - Additional Personnel (1 Environmental Group Manager and 4 additional Water Program Specialist): \$750 K
 - Up front Analytical Equipment Cost, vehicle cost (4 new vehicles, 5 new skids of analytical equipment.): \$780K (Equipment will be to be replaced after 6 years)
 - Annual Equipment and Maintenance Cost - \$125K

Non-significant Wastewater Facilities

Action: Reviewed feasibility of nitrogen and phosphorus reduction at small sewage treatment facilities.

Findings: This group of facilities discharge less nutrient to streams, so reductions are limited. Significant technical and financial support would be needed to upgrade this reduction of nutrient, and current low levels of N and P do not justify the cost and effort.

However, the wastewater workgroup recommends that if a facility needs to expand or upgrade due to a facility reaching the end of its useful life or due to service area growth, nutrient removal alternatives should be evaluated and compared to other more conventional alternatives.

Estimated annual cost: \$TBD, Varies by Facility

On-lot Septic Systems

Action: Reviewed feasibility of adding denitrification systems to homeowner septic systems.

Findings: Homeowners with septic tanks could lower N and P by adding a denitrification system. Nitrogen would be reduced by approximately 144,000 lbs/yr. This low benefit high cost alternative is not recommended by the wastewater workgroup.

Instead, the workgroup recommends municipalities implement on-lot system operation and maintenance programs to ensure that the existing on-lot systems are being maintained properly. This is both good for local ground water quality, the Chesapeake Bay, and it will extend the life of the existing on-lot system.

Estimated cost for a basic system: \$10,000 to \$15,000

Biological Nutrient Reduction

Action: Use BNR to remove nitrogen and phosphorus from wastewater.

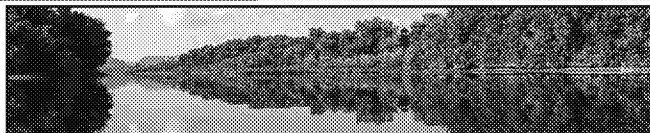
Goal 1: Implement in 190 wastewater treatment facilities by 2025. This goal was met in 2018.

Estimated cost: \$1.4 Billion

Additional Recommendations

To reach these goals, the state, local partners, and industry will have to work together. The Phase 3 WIP Wastewater Workgroup offers the following recommendations for how to do that:

1. **Ongoing monitoring of Wastewater facilities.** Ongoing monitoring of wastewater facilities is recommended. This will ensure up to date nitrogen and phosphorus data.
2. **Continue use of BNR.** This is an effective method for N and P reduction. It is in use by 190 wastewater treatment plants. Use of this method helped the wastewater sector reach their 2025 goals in 2018.
3. **Explore options for a regional N and P trading program.** Some sectors will easily meet or exceed N and P reduction goals, and other will find it costly and difficult to reach theirs. A regional program for trading N and P reduction credits can help PA reach its total N and P reduction goals.
4. **Other Recommendations....**



Challenges

To reach these goals, the state, partners, and industry will have to overcome some challenges. The Phase 3 WIP Wastewater Workgroup offers the following recommendations for how to do that:

1. **Communication.**
2. **Staff & Training.**
3. **Cultural.**
4. **Timing.**
5. **Finances.**
6. **Tracking.**
7. **Scale.**
8. **Awareness.**

Resource Needs

To reach these goals, the state, local partners, and industry will need additional support. The Phase 3 WIP Wastewater Workgroup offers the following recommendations for how to do that:

1. **Compliance (Permitting, Compliance Assurance, Inspection, Enforcement).**
2. **Technical Assistance for BMP Design, Oversight and Implementation.**
3. **Financial Assistance for BMP Design and Implementation.**

